Claims

1. An apparatus for detecting the hydrogen content of an object (101), wherein the apparatus (100) comprises
   - a neutron source (103) that emits fast/energy-rich neutrons;
   - a detector device (102; 102a; 102b) for detecting thermal neutrons;
   - a moderator (104; 104'; 104") that brakes and reflects neutrons upon collision;

   characterised in that
   - said detector device comprises
     - a light-emitting unit (102b) that emits light in case of a nuclear event/reaction with a thermal neutron; and
     - a light-registering unit (102a) that emits an electric pulse/an electric signal (106) when a flash of light is detected;
   - and that said moderator (104', 104") is a light-conductive unit arranged between said light-emitting unit (102) and said light-registering unit (102a).

2. An apparatus according to claim 1, **characterised in** that said light-emitting unit (102b) is a scintillator and that said light-registering unit (102a) is a photo-multiplier (PM) or a photo-diode.

3. An apparatus according to claims 1-2, **characterised in** that said source (103) is comprised of or embedded in said moderator (104').

4. An apparatus according to claims 1-3, **characterised in** that said source (103) is arranged essentially in proximity of or about/in the centre of the face of said moderator (104', 104") that adjoins the light-emitting unit (102b).

5. An apparatus according to claims 1-4, **characterised in** that said light-conductive unit (104') is configured essentially with a face that adjoins said light-emitting unit (102b) and having a relatively smaller face adjoining a detection face (107) of said light-registering unit (102a).

6. An apparatus according to claims 1-5, **characterised in** that said light-conductive unit (104") is configured for emitting light conducted from said light-emitting unit (102b) to the light-registering unit (102a) essentially perpendicular to a detection face (109) of the apparatus (100).

7. An apparatus according to claims 1-5, **characterised in** that said light-conductive unit (104") is configured for emitting light conducted from said light-emitting unit (102b) to the light-registering unit (102a) essentially in parallel with a detection face (109) of the apparatus (100).

8. An apparatus according to claims 1-7, **characterised in** that the apparatus further comprises an electric circuit (105) connected to said detector device (102; 102a), wherein said circuit (105) is configured for generating a signal (108) that represents an estimated amount of hydrogen, water and/or humidity content on the basis of the electric signal (106) from said light-registering unit (102a).

9. A method of detecting the hydrogen content (101) of an object comprising the steps of:

- emitting fast/energy-rich neutrons from a neutron source (103);
- detecting thermal neutrons by means of a detector device (102; 102a; 102b);

- braking and reflecting neutrons by collision of a moderator (104; 104'; 104''),

characterised in that the method further comprises:

- emitting light by a light-emitting unit (102b) in the event of a nuclear event/reaction with a thermal neutron;
- emitting an electric pulse/an electric signal (106) by a light-registering unit (102a) upon recording of a flash of light; and
- conducting light from said light-emitting unit (102b) to said light-registering unit (102a) by a light-conductive unit arranged between said light-emitting unit (102b) ands said light-registering unit (102a); of which said moderator (104'; 104'') is the light-conductive unit.

10. A method according to claim 9, **characterised in** that said light-emitting unit (102b) is a scintillator and that said light-registering unit (102a) is a photo-multiplier (PM) or a photo-diode.

11. A method according to claims 9-10, **characterised in** that said source (103) is comprised of or embedded in said moderator (104').

12. A method according to claims 9-11, **characterised in** that said source (103) is arranged essentially in proximity of or around/in the centre of the face of the moderator (104', 104'') that adjoins the light-emitting unit (102b).

13. A method according to claims 9-12, **characterised in** that said light-conductive unit (104') is configured essentially with a face that adjoins said light-emitting unit (102b) and having a relatively smaller face adjoining a detection face (107) of said light-registering unit (102a).

14. A method according to claims 9-13, **characterised in** that said light-conductive unit (104") is configured for emitting light conducted from said light-emitting unit (102b) to the light-registering unit (102a) essentially perpendicular to a detection face (109).

15. A method according to claims 9-13, **characterised in** that said light-conductive unit (104") is configured for emitting light conducted from said light-emitting unit (102b) to the light-registering unit (102a) essentially in parallel with a detection face (109).

16. A method according to claims 9-15, **characterised in** that the method further comprises generation, in an electric circuit (105) connected to said detector device (102; 102a), of a signal (108) representing an estimated amount of hydrogen, water and/or humidity content, wherein said generation is performed on the basis of the electric signal (106) from said light-registering unit (102a).